

New and Inadequately Described Aberrations of *Abraxas grossulariata* (Linn.) (Lep.:Geometridae)

By G. EVELYN HUTCHINSON

Osborn Memorial Laboratories, Yale University, New Haven, Conn. 06520 U.S.A.

This paper has been written to give formal descriptions and illustrations of certain new aberrations of the magpie moth, mentioned in a discussion of some aspects of polymorphism in a contribution to a forthcoming volume in memory of my former student, the late Professor Robert H. MacArthur. I take the opportunity also to publish notes on inadequately described, though named, forms of the species. Nearly all the material discussed is in the Rothschild-Cockayne-Kettlewell Collection now in the Natural History Museum in South Kensington, but reference is made to material in the Royal Albert Museum, Exeter and the Yorkshire Museum, York. My thanks are due to Mr A. L. Goodson of Tring, Mr D. J. Carter of the Natural History Museum, Dr Colin Simms of the Yorkshire Museum and the authorities of the Royal Albert Museum for their help when visiting the collections in their charge.

The terminology of the wing pattern used throughout the paper is that of Hutchinson (1969), as given in plate XVIII.

Plate XVII

New or inadequately described aberrations of *Abraxas grossulariata*.

- a. ab. **perpallida** n.; holotype, Enniskillen; R.-C.-K. coll. B.M
- b. ab. **perpallida** n.; allotype, Aberdeen, Royal Albert Museum Exeter.
- c. ab. **perpallida** n.; ? Annersley, probably this aberration. R.-C.-K. coll. B.M.
- d. ab. **depauperata** n.; holotype, Hornsey Rise; R.-C.-K. coll. B.M.
- e. ab. **triumvirorum** n., holotype, Croydon; R.-C.-K. coll. B.M.
- f. ab. **eppingensis** n.; holotype, Epping; R.-C.-K. coll. B.M.
- g. ab. **eppingensis** n. paratype, Epping; R.-C.-K. coll. B.M.
- h. ab. **chalcobares** Raynor; holotype, Doncaster; R.-C.-K. coll. B.M.
- i. cf ab. **chalcobares**; no precise locality, ex Oberthür coll.; R.-C.-K. coll. B.M.
- j. ab. **raynori** Porritt; holotype, Tolson Museum, Huddersfield, after painting by Miss Gallwey; R.-C.-K. coll. B.M.
- k. ab. **odersfeltia** Porritt; holotype, Tolson Museum, Huddersfield, after painting by Miss Gallwey; R.-C.-K. coll. B.M.
- l. ab. **mixta** Porritt; holotype, Tolson Museum, Huddersfield, after painting by Miss Gallwey; R.-C.-K. coll. B.M.
- m. ab. **aureofasciata** Porritt; holotype, Tolson Museum, Huddersfield, after painting by Miss Gallwey; R.-C.-K. coll. B.M.
- n. ab. **cockayni** n.; holotype, Huddersfield; R.-C.-K. coll. B.M.
- o. ab. **cockayni** n.; paratype, Manchester; R.-C.-K. coll. B.M.
- p. ab. **nigrofusa** Raynor; Lancs stock, bred 1919; R.-C.-K. coll. B.M.
- q. ab. **lactea-sparsa** Raynor; Lancs. stock, bred 1919; R.-C.-K. coll. B.M.

ab. **perpallida** n. Black markings on the dorsal side of forewing limited to a small antemedian (AMDB2) spot at the base of the wing, a small costal spot, the extreme costal part of the antifascial black band, and small blackish-brown terminals. The three small but fairly conspicuous markings thus present just within the costa, are characteristic; in the holotype their pigment is confined to the dorsal surface. Discal spot brown; some faint brownish markings representing the central part of the antifascial and the postfascial black markings are present at the sides of the yellow fascia. Hindwing without discal spot but with small terminals visible only dorsally. Abdomen yellow. Span 42 mm.

♂, *holotype*. Enniskillen, Northern Ireland (J. E. R. Allen, 1908) R.-C.-K. coll. B.M. (Pl. XVIIa). All dark markings are slightly larger on the right than on the left hand wings.

♀, *allotype*. Aberdeen, Scotland (reared W. L. Newman 12 July 1910) Royal Albert Museum, Exeter (Pl. XVIIb). Very like the holotype but with indications of a proximal as well as a distal antemedian spot at the base of the wing and with a blackish discal spot.

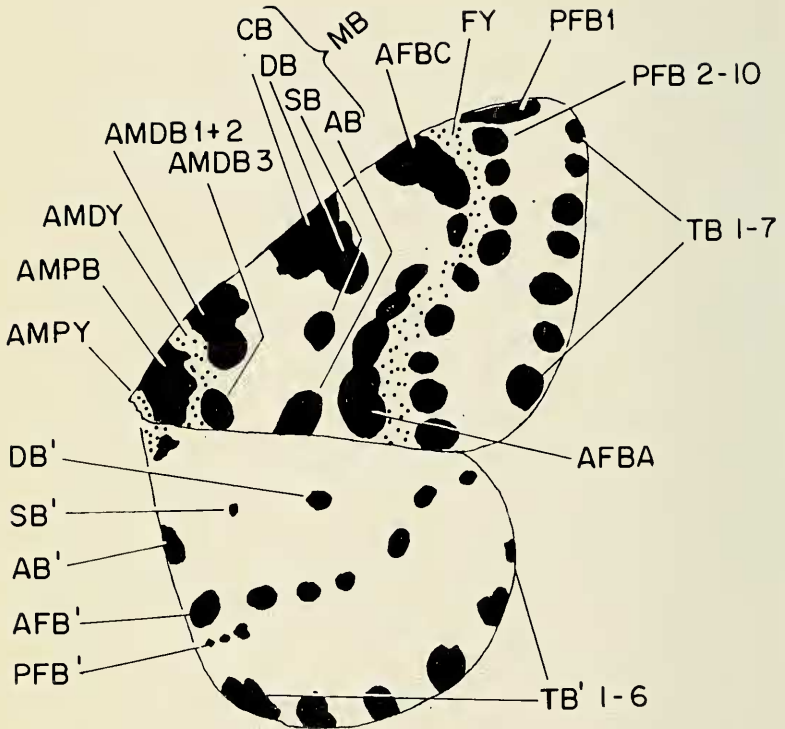
♂, ? Annersley, England (A. T. Mitchell) R.-C.-K. coll. B.M. This specimen differs from the two types in having some black pigmentation ventrally below the spots within the costal margin of the forewing and in having a row of black spots on the abdomen; in other respects its dark markings are less developed, the terminals being obsolete on the forewings and absent on the hindwings, though the left hindwing has a brown discal spot (Pl. XVIIc). The scaling is somewhat defective. Attribution to *perpallida* is perhaps a little tentative.

All three specimens, in spite of slight differences, look very much alike in their pallid coloration, relieved primarily by the three dark marks just within the costa of the forewing. Very extreme ab. *dohrni* Koenig, referable to ab *centralipuncta* Raynor, have no costal spot (Aberdeen, Newman 10. VII. 1910; R.-C.-K. coll.) or lack almost all dark pigmentation except the discal spot (Roydon, Suffolk. G. J. Baker 18. VIII. 1955; R.-C.-K. coll.).

If my sexing is correct, *perpallida* cannot be the unknown phenotype simultaneously expressing both *dohrni* and *paucisignata* Lempke which would be expected to be very pale, but which may be lethal (Cockayne 1937).

The ? Annersley specimen, the Aberdeen specimen of ab. *centralipuncta* and a very similar specimen, but with a faint violaceous suffusion (Angleterre, Oberthür coll.; with label "Figured Études d'Ent. 1896 20 Pl. 21 fig. 360. Lep. Comp. 1925. 22 (2) Pl. 599. fig. 5113") were placed at the end of the series of ab. *paucisignata* by Cockayne.

ab. **triumvirorum** n. Anterior wing with the dark markings of the costal half obsolete, represented by very feeble antemedian spots, a brownish faint discal and traces of brownish postfascial markings which become somewhat stronger in the



Diagram, based largely on the Linnaean type which is however, a little too heavily marked to be quite representative, of Figure 1. Diagram, based largely on the Linnaean type which is however, a little too heavily marked to be quite representative, of the black (heavy black) and yellow (stippled) markings on the upper surface of the wing in *A. grossulariata*. AMPY, proximal antemedian yellow marking, AMPB, proximal antemedian black band, AMDY distal antemedian yellow mark, AMBD 1+2, 3, the three antemedian black spots, the first two fused. CB costal black spot fused to DB discal black spot, SB subdiscal black spot, AB anal black spot, AFBC costal and AFBA anal portions of antifascial black band; PFB 1, PFB 2-10 postfascial black markings, FY yellow fascia. TB 1-7 black terminal spots. Hind wing symbols as forewing with prime.

anal part of the wing; anterior terminals obsolete, posterior three small but conspicuous; hindwing with a full set of terminals, though the first is subobsolete, pigmented both dorsally and ventrally; abdomen with three rows of black spots; span 44 mm.

♀ *holotype*. Croydon (G. C. Goldthwaite) R.-C.-K. coll., B.M. Distinguished by the obsolescence of all the dark markings on the wings save the last three terminals of the forewing and all but the first of those of the hindwing. Though the latter markings are small, they are quite conspicuous by contrast (Pl. XVIIe) with the rest of the wing.

ab. *depauperata* n. All black pigment absent, discal spot dark brown, distal black fascial markings replaced by yellowish brown merging into yellow fascia. terminals brownish yellow on both wings. Span 31 mm.

? ♂ *holotype*, Hornsey Rise, 1913, R.-C.-K. coll. This small and rather wretched-looking specimen is of interest, as showing that when black pigment is absent, some, but not all, of the dark markings are still indicated by a brown pigment. It was labelled 'albino' by Cockayne, but this is an inappropriate description as yellow and brown pigments are present (Pl. XVIIId).

ab. *nigrolutea* Raynor (1907). This aberration was described as *lutea* Cockerell with an unusual amount of black on the front wings. The descriptions (1907, 1920) give no indications of the disposition of the black. Ten specimens in the R.-C.-K collection are referred to the aberration, the most extreme being one of Raynor's labelled "Yorks. ex2 '20". The only one bearing the name *nigrolutea*, on a label on the pin, is stated to be from "Harwood Sale 1912." This specimen presumably gives some idea, in default of a known type, of what Raynor meant by "an unusual amount of black on the forewing." It is like Lempke's figure (Lempke 1951, fig. 8) of ab. *nigrofasciata* Raynor in which the antifascial band and the postfascial spots tend to fuse over the yellow fascia, but with the black somewhat more extensive and the pale areas suffused with yellow, the hindwing being pale yellowish with indications of a deeper yellow fascia. Raynor's most extreme specimen is comparable, but the black markings are more extensive, approaching ab. *hazeleighensis* Raynor. The name *nigrolutea* clearly designates more than one genetically distinct phenotype, and is moreover unnecessary, the specimens to which it refers being reasonably named *lutea-nigrofasciata*, *lutea-hazeleighensis* etc.

ab. *rubrolutea* Raynor (1909). This is an intense form of *lutea* in which the ground colour of the forewings is reddish-orange, with the hindwings slightly paler. It would not be surprising if it proved to be homozygous *lutea* combined with the gene that converts the ordinary yellow or yellowish orange fascia of *grossulariata* into the reddish orange fascia of *igneofasciata* Raynor (1909). The R.-C.-K. collection contains five specimens of *rubrolutea*; of these four were bred

by Raynor between 1909 and 1927, the earliest one being just too late to be designated a lectotype. The fifth specimen, presumably wild-caught or bred from a wild larva, is from Angmering, Sussex 1898; it is just as splendid as the others. There is also a specimen of *rubrolutea-nigrolineata*, marked Lancs. ex 11 '23 and one of the *rubrolutea-lunulata*, labelled Lancs. Quibell Ex 4.1926. It must be admitted that although these seven specimens are highly characteristic when examined by themselves, some specimens of supposedly homozygous *lutea* approach *rubrolutea*.

ab. *nigrosarsata* Raynor (1903). This aberration seems to have appeared in South Wales before 1900 (Barrett 1901). Porritt (1921) gave an account of its increasing proportion in the Huddersfield population between 1905 and 1917, when nearly 10% was of this form. Subsequently the species became very scarce and when it reappeared in numbers, the proportion of *nigrosarsata* was much reduced.

Through the kindness of Dr Colin Simms, I have been able to study the collections in the Yorkshire Museum. Of the twenty specimens collected by T. H. Allis before 1870, and clearly selected to show as much variation as possible, including a nice ab. *actinota* Raynor, there are no typical *nigrosarsata*, though one specimen has some extra black spots, larger than in that form, on the hindwing. In the H. Dobson collection, made between 1905 and 1925, there are sixty-eight specimens of *A. grossulariata* of which twenty-one are *nigrosarsata* to varying degrees. Although the series again clearly contains all the more aberrant specimens that Dobson could collect and is certainly not a random sample, it is evident that at York, as at Huddersfield, it was far easier to obtain *nigrosarsata* in the first quarter of the present than in the middle of the last century.

ab. *eppingensis* n. All black markings somewhat enlarged and some of them greatly so, but in a very irregular and asymmetrical manner. Span 41 mm.

♀, *holotype*; and 4 ♀ *paratypes* with one of uncertain sex (Pl. XVII f, g) Epping, England, (June 1933, H. D. Smart) R.-C.-K. coll. B.M.

The aberration is presumably genetically determined; the individuals of the typical series may well be sisters. In the strong asymmetry of the pattern on the hindwings as well as of that of the forewings, ab. *eppingensis* presumably differs from the "small, rather dark, prettily marked form, of which a great many individuals have the markings asymmetrical on the forewings" recorded by Stonell (1905) from Perth, but unhappily, like so many other forms of *A. grossulariata*, apparently never figured.

ab. *chalcobares* Raynor (1907). The whole of the pale area of the forewing, except the white between the post-fascial black marks and the termen, yellow, suffused with dark grey, as in ab. *nigrotincta* Raynor, giving the uniform bronze appearance of the ground colour, implied by the

name. The hindwing is dark grey as in *nigrotincta*, yellow being limited to a well marked fascia of a kind also often found in ab. *dohrni*. The specimen, marked type at the side, bears a label "bred Doncaster 1903". Raynor says it was "reared from a Lancashire larva, by a friend of mine in 1904, and generously presented to myself". The date is presumably given incorrectly by Raynor; if the county of origin is correct, the friend may have been none other than Leonard Doncaster. It is however just possible that both date and locality are given wrongly in the original description and that the larva came from Doncaster, Yorkshire.

Though known from the unique type for seventy years, ab. *chalcobaris* has apparently never been figured (Pl. XVIIh).

Below the type in the R.-C.-K. collection, there is a specimen without indication of locality, from the Oberthür collection, in which the forewing has all the pale areas proximal to the fascia suffused with grey, as in *chalcobares* but without the yellow of the latter form; the hindwing has the typical pattern of *grossulariata* (Pl. XVIIi).

ab. *raynori* Porritt (1920). The whole of the area proximal to the yellow fascia is obliterated by black; the fascia is wide and seems to be somewhat irregular, with its distal margin displaced proximally; the postfascial black spots are somewhat elongate, but owing to the proximal displacement of the fascia, the white space between these spots and the terminals is very wide; the antefascial band of the hindwing consists of large irregular blotches.

This form, of which no figure has been published, was reared by Porritt from an original pair and is said to have bred true, so is probably an autosomal recessive.

I have not been able to study the Porritt collection in the Tolson Museum at Huddersfield, but believe it is desirable to figure this (Pl. XVIIj) and the next three forms from water-colour paintings by Miss Gallwey, prepared for Cockayne (1937). exhibited by him¹, and then placed in the R.-C.-K. collection.

There are a number of specimens in that collection in which the whole or almost the whole of the area between the basal antemedian yellow mark and the yellow fascia is black. These differ from ab. *hazeleighensis* Raynor mainly in the clear orange-yellow fascia and the distinct postfascial white area; only one has all the characters of *raynori*.

ab. *odersfeltia* Porritt (1920). Like the preceding but with some white proximal to the yellow fascia. The postfascial black spots moreover are not elongate and the hindwing is as in typical *grossulariata*. The pattern has a washed out or dilute appearance.

¹In the report of the Annual Exhibition and Conversazione of the South London Entomological and Natural Society, at which these paintings were exhibited by Cockayne, there is no mention of that of ab. *raynori*, but it clearly belongs with the others then shown.

Porritt's description is not at all clear and does not agree with the illustrations of the type (Pl. XVIIk). There is a specimen in the R.-C.-K. collection from Huddersfield which resembles the painting fairly well, and another, with postfacial black marking obsolete except near the anal margin and a very washed-out appearance, from the New Forest, presumably belongs here.

ab. *mixta* Porritt (1920). Described as differing from *odersfeltia* in having the broad costal black band interrupted by two white spots and in lacking the washed-out appearance. The figure of the type (Pl. XVIII) is not in very good agreement with the description. Porritt had six or seven specimens reared from wild larvae taken at Huddersfield and believed that there was a specimen in the Sydney Webb collection; this may have been an insect figured by Barrett (1901; Pl. 321 fig. 1c). There are three specimens in the R.-C.-K. collection labelled as "near ab. *mixta* Porritt." They do not seem to me to belong with this aberration.

ab. *aureofasciata* Porritt (1920). Proximal antemedian black band obsolete; costal margin with a wide black band interrupted centrally, apparently produced by fusion of the distal antemedian and costal spots and by the spread of the costal part of the antifascial black markings proximally down the costa; a second antemedian distal black spot, elongate towards the subdiscal and a third towards the anal spot; yellow fascia of a deep golden colour, very wide, bordered with small postfacial spots, which are separated from the small terminals by a wide white area.

The painting of the type (Pl. XVIIm) of this beautiful form was placed in the R.-C.-K. collection with such well-marked synthetic derivatives of *dohrni* as ab. *gloriosa* Raynor. No information is available about the underside of the wing. Ab. *aureofasciata* is however almost certainly an independent mutant occurring very rarely in nature; three specimens were reared from wild larvae taken at Huddersfield by Mr James Lee.

In the R.-C.-K. collection there are specimens bred both by Raynor and probably by Onslow (21 VIII ♀ 26) also. These are labelled as *aureofasciata-nigrocostata*. In them the golden yellow extends from the fascia almost to the base of the wing. They look like *dohrni* combined with *aureopicta* Cockayne.

ab. *cockayni* n. Forewing with distal antemedian black spot fused with costal and costal part of antifascial black marking to produce a heavy costal stripe interrupted on its extreme costal border by a minute white spot; antifascial markings extended proximally to form a stripe parallel to the costal stripe and separated from it by a narrow elongate white mark which may be divided; anal spot fused with anal part of antifascial black markings; anal part of yellow fascia extended proximally above the fused anal spot towards the base of the wing; antifascial black spots of hindwing well